Vision-Based Automation System for Safe and Efficient Taxi Operations, Phase I

Completed Technology Project (2017 - 2017)

Project Introduction

In 2012 the National Transportation Safety Board (NTSB) issued safety recommendations to the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA), recommending certain anti-collision aids for large airplane models. These communications referenced investigations of accidents that occurred during taxi when a large airplane?s wingtip collided with another airplane or object on the taxiway. In all of the accidents referenced, the pilots of the large airplanes were either unable to determine or had difficulty determining the separation between the airplane?s wingtips and the other airplane or object while taxiing. Typically, pilots look out the cockpit window at the wingtips to determine wingtip path and clearance, but on large airplanes the pilot cannot see the airplane?s wingtips from the cockpit unless the pilot opens the cockpit window and extends his or her head out of the window, which is often impractical. Certain aircraft have cameras to aid taxi operations, but the cameras? view did not include the wing tips. NTSB recommended the installation of an anti-collision aid, such as a camera system, on all newly manufactured and newly type-certificated large airplanes, and existing large airplanes to be retrofitted with a similar anti-collision aid. In view of the recommended camera systems, additional automation is proposed that will take advantage of such sensors to further enhance the safety and efficiency of taxi operations, beyond that made possible by the sensors alone. The envisioned vision-based automation system will provide benefit in three applications: (i) to provide automated collision detection and avoidance for enhanced safety during taxi; (ii) to provide vision-based navigation for enhanced situation awareness during taxi operations; and (iii) to aid in autonomous taxi capabilities.

Primary U.S. Work Locations and Key Partners
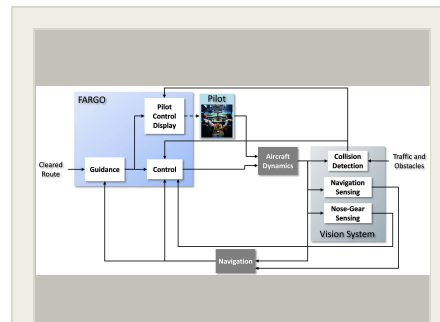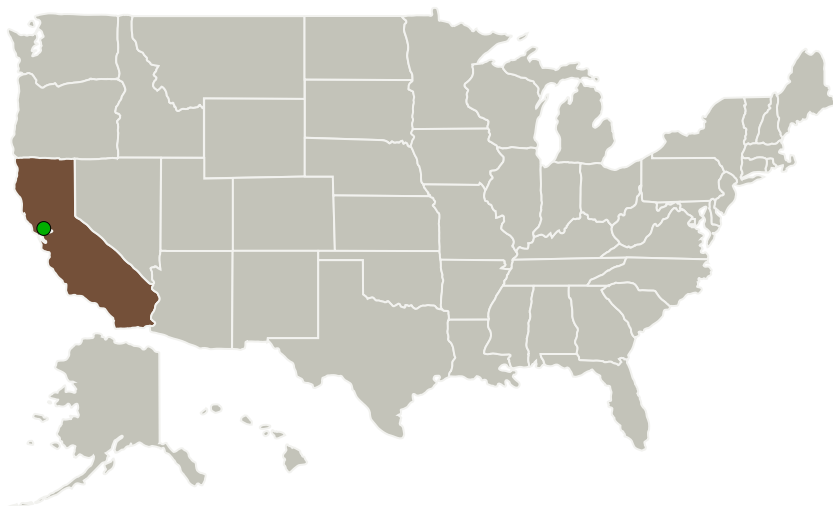
Vision-Based Automation System for Safe and Efficient Taxi Operations, Phase I Briefing Chart Image

Table of Contents

Vision-Based Automation System for Safe and Efficient Taxi Operations, Phase I

Completed Technology Project (2017 - 2017)

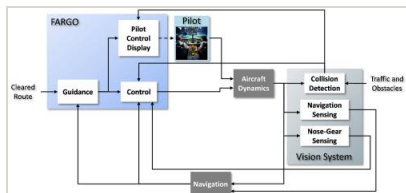| Organizations Performing Work	Role	Type	Location
Optimal Synthesis, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California
🟢Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Images

Briefing Chart Image
Vision-Based Automation System for Safe and Efficient Taxi Operations, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/133145)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Optimal Synthesis, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
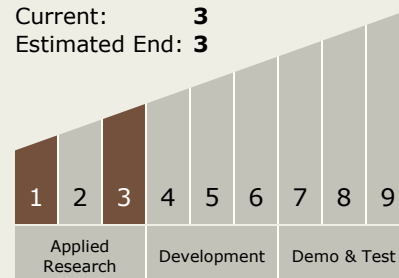
Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Victor H Cheng

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/93830

Page 2

Technology Areas

Primary:

- TX01 Propulsion Systems
  └ TX01.3 Aero Propulsion
    └ TX01.3.8 All Electric
      Propulsion

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System